SEQUENCE LISTING

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Obar, Robert
Wu, Ying-Jye

<120> Methods for the Detection of Cervical Cancer

<130> MTP-023DV2

<140> US 09/315,355
<141> 1999-05-17

<150> US 08/989,045
<151> 1997-12-11

<150> US 08/705,660
<151> 1996-08-30

<160> 48

<170> PatentIn version 3.0

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Pro Ala Ala Ser Leu Ala Val His Thr Asp Lys
1 5 10

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Phe Ser Gly Gln Ile Glu Arg
1 5

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<400> 3

Arg Leu Ile Ala Glu Ala Lys Glu Lys
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Pro Ser Leu Val His Ser Arg Asp Met
1 5

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Val Trp Asp Ile Ser Thr Val Ser Ser Val Asn Glu Ala Phe Gly Arg
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Leu Val Leu Gly Ser Ala Arg Asn Ser Ser Ile Ser Gly Pro Phe Gly
1 5 10 15

Ser Arg

<210> 7
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<213> Homo sapiens

<400> 7

Ser Asp Lys Pro Ile Phe Thr Leu Asn Ala His Asn Asp Glu Ile Ser
1 5 10 15

Gly Leu Asp Leu Ser Ser Gln Ile Lys
20 25

<210> 8
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Val Gln Thr Leu Gln Phe His Pro Phe Glu Ala Gln Thr Leu Ile Ser
1 5 10 15

Gly Ser Tyr Asp Lys
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<210> 9
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<400> 9

Met Gly Val Leu Phe Cys Ser Ser Cys Cys Pro Asp Leu Pro Phe Ile
1 5 10 15

Tyr Ala Phe Gly Gly Gln Lys
20

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<213> Homo sapiens

<400> 10

Met Asn Arg Ser Arg Gln Val Thr Cys Val Ala Trp Val Arg Cys Gly
1 5 10 15

Val Ala Lys Glu Thr Pro Asp Lys Val Glu Leu Ser Lys Glu Glu Val
20 25 30

Lys Arg Leu Ile Ala Glu Ala Lys Glu Lys Leu Gln Glu Glu Gly Gly
35 40 45

Gly Ser Asp Glu Glu Glu Thr Gly Ser Pro Ser Glu Asp Gly Met Gln
50 55 60

Ser Ala Arg Thr Gln Ala Arg Pro Arg Glu Pro Leu Glu Asp Gly Asp
65 70 75 80

Pro Glu Asp Asp Arg Thr Leu Asp Asp Asp Glu Leu Ala Glu Tyr Asp
85 90 95

Leu Asp Lys Tyr Asp Glu Glu Gly Asp Pro Asp Ala Glu Thr Leu Gly
100 105 110

Glu Ser Leu Leu Gly Leu Thr Val Tyr Gly Ser Asn Asp Gln Asp Pro
115 120 125

Tyr Val Thr Leu Lys Asp Thr Glu Gln Tyr Glu Arg Glu Asp Phe Leu
130 135 140

Ile Lys Pro Ser Asp Asn Leu Ile Val Cys Gly Arg Ala Glu Gln Asp
145 150 155 160

Gln Cys Asn Leu Glu Val His Val Tyr Asn Gln Glu Glu Asp Ser Phe
165 170 175

Tyr Val His His Asp Ile Leu Leu Ser Ala Tyr Pro Leu Ser Val Glu
180 185 190

Trp Leu Asn Phe Asp Pro Ser Pro Asp Asp Ser Thr Gly Asn Tyr Ile
195 200 205

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Ala Val Gly Asn Met Thr Pro Val Ile Glu Val Trp Asp Leu Asp Ile
    210                 215                 220

Val Asp Ser Leu Glu Pro Val Phe Thr Leu Gly Ser Lys Leu Ser Lys
225                 230                 235                 240

Lys Lys Lys Lys Lys Gly Lys Lys Ser Ser Ser Ala Glu Gly His Thr
                245                 250                 255

Asp Ala Val Leu Asp Leu Ser Trp Asn Lys Leu Ile Arg Asn Val Leu
            260                 265                 270

Ala Ser Ala Ser Ala Asp Asn Thr Val Ile Leu Trp Asp Met Ser Leu
        275                 280                 285

Gly Lys Pro Ala Ala Ser Leu Ala Val His Thr Asp Lys Val Gln Thr
    290                 295                 300

Leu Gln Phe His Pro Phe Glu Ala Gln Thr Leu Ile Ser Gly Ser Tyr
305                 310                 315                 320

Asp Lys Ser Val Ala Leu Tyr Asp Cys Arg Ser Pro Asp Glu Ser His
                325                 330                 335

Arg Met Trp Arg Phe Ser Gly Gln Ile Glu Arg Val Thr Trp Asn His
            340                 345                 350

Phe Ser Pro Cys His Phe Leu Ala Ser Thr Asp Asp Gly Phe Val Tyr
        355                 360                 365

Asn Leu Asp Ala Arg Ser Asp Lys Pro Ile Phe Thr Leu Asn Ala His
    370                 375                 380

Asn Asp Glu Ile Ser Gly Leu Asp Leu Ser Ser Gln Ile Lys Gly Cys
385                 390                 395                 400

Leu Val Thr Ala Ser Ala Asp Lys Tyr Val Lys Ile Trp Asp Ile Leu
                405                 410                 415

Gly Asp Arg Pro Ser Leu Val His Ser Arg Asp Met Lys Met Gly Val
            420                 425                 430

Leu Phe Cys Ser Ser Cys Cys Pro Asp Leu Pro Phe Ile Tyr Ala Phe
        435                 440                 445

Gly Gly Gln Lys Glu Gly Leu Arg Val Trp Asp Ile Ser Thr Val Ser
    450                 455                 460

Ser Val Asn Glu Ala Phe Gly Arg Arg Glu Arg Leu Val Leu Gly Ser
465                 470                 475                 480

Ala Arg Asn Ser Ser Ile Ser Gly Pro Phe Gly Ser Arg Ser Ser Asp
                485                 490                 495

Thr Pro Met Glu Ser
            500
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Asp Tyr Ser Gln Tyr Tyr Arg
1 5

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<213> Homo sapiens

<400> 12

Asn His Glu Glu Glu Met Asn Ala Leu Arg
1 5 10

<210> 13
<211> 13
<212> PRT
<213> Homo sapiens

<400> 13

Leu Leu Glu Gly Glu Asp Ala His Leu Thr Gln Tyr Lys
1 5 10

<210> 14
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<400> 14

Ile Leu Asn Glu Met Arg
1 5

<210> 15
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<213> Homo sapiens

<400> 15

Ser Glu Ile Ser Glu Leu Arg
1 5

<210> 16
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<400> 16

Asp Ala Glu Asp Trp Phe Phe Ser Lys
1 5

<210> 17
<211> 11
<212> PRT
<213> Homo sapiens

<400> 17

Leu Ser Val Glu Ala Asp Ile Asn Gly Leu Arg
1 5 10

<210> 18
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<213> Homo sapiens

<400> 18

Met Thr Thr Ser Ile Arg Gln Phe Thr Ser Ser Ser Ser Ile Lys Gly
1 5 10 15

Ser Ser Gly Leu Gly Gly Gly Ser Ser Arg Thr Ser Cys Arg Leu Ser
20 25 30

Gly Gly Leu Gly Ala Gly Ser Cys Arg Leu Gly Ser Ala Gly Gly Leu
35 40 45

Gly Ser Thr Leu Gly Gly Ser Ser Tyr Ser Ser Cys Tyr Ser Phe Gly
50 55 60

Ser Gly Gly Gly Tyr Gly Ser Ser Phe Gly Gly Val Asp Gly Leu Leu
65 70 75 80

Ala Gly Gly Glu Lys Ala Thr Met Gln Asn Leu Asn Asp Arg Leu Ala
85 90 95

Ser Tyr Leu Asp Lys Val Arg Ala Leu Glu Glu Ala Asn Thr Glu Leu
100 105 110

Glu Val Lys Ile Arg Asp Trp Tyr Gln Arg Gln Ala Pro Gly Pro Ala
115 120 125

Arg Asp Tyr Ser Gln Tyr Tyr Arg Thr Ile Glu Glu Leu Gln Asn Lys
130 135 140

Ile Leu Thr Ala Thr Val Asp Asn Ala Asn Ile Leu Leu Gln Ile Asp
145 150 155 160

Asn Ala Arg Leu Ala Ala Asp Asp Phe Arg Thr Lys Phe Glu Thr Glu
165 170 175

Gln Ala Leu Arg Leu Ser Val Glu Ala Asp Ile Asn Gly Leu Arg Arg
180 185 190

Val Leu Asp Glu Leu Thr Leu Ala Arg Ala Asp Leu Glu Met Gln Ile

```
        195                 200                 205

Glu Asn Leu Lys Glu Glu Leu Ala Tyr Leu Lys Lys Asn His Glu Glu
    210                 215                 220

Glu Met Asn Ala Leu Arg Gly Gln Val Gly Gly Glu Ile Asn Val Glu
225                 230                 235                 240

Met Asp Ala Ala Pro Gly Val Asp Leu Ser Arg Ile Leu Asn Glu Met
                245                 250                 255

Arg Asp Gln Tyr Glu Lys Met Ala Glu Lys Asn Arg Lys Asp Ala Glu
            260                 265                 270

Asp Trp Phe Phe Ser Lys Thr Glu Glu Leu Asn Arg Glu Val Ala Thr
        275                 280                 285

Asn Ser Glu Leu Val Gln Ser Gly Lys Ser Glu Ile Ser Glu Leu Arg
    290                 295                 300

Arg Thr Met Gln Ala Leu Glu Ile Glu Leu Gln Ser Gln Leu Ser Met
305                 310                 315                 320

Lys Ala Ser Leu Glu Gly Asn Leu Ala Glu Thr Glu Asn Arg Tyr Cys
                325                 330                 335

Val Gln Leu Ser Gln Ile Gln Gly Leu Ile Gly Ser Val Glu Glu Gln
            340                 345                 350

Leu Ala Gln Leu Arg Cys Glu Met Glu Gln Gln Asn Gln Glu Tyr Lys
        355                 360                 365

Ile Leu Leu Asp Val Lys Thr Arg Leu Glu Gln Glu Ile Ala Thr Tyr
    370                 375                 380

Arg Arg Leu Leu Glu Gly Glu Asp Ala His Leu Thr Gln Tyr Lys Lys
385                 390                 395                 400

Glu Pro Val Thr Thr Arg Gln Val Arg Thr Ile Val Glu Glu Val Gln
                405                 410                 415

Asp Gly Lys Val Ile Ser Ser Arg Glu Gln Val His Gln Thr Thr Arg
            420                 425                 430
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<210> 19
<211> 18
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<400> 19

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Phe Gly Gly Asn Pro Gly Gly Phe Gly Asn Gln Gly Gly Phe Gly Asn
1               5                   10                  15

Ser Arg
```

<210> 20
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<400> 20

Trp Cys Asp Cys Lys
1 5

<210> 21
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<212> PRT
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<400> 21

Thr Thr Glu Gln Asp Leu Lys
1 5

<210> 22
<211> 6
<212> PRT
<213> Homo sapiens

<400> 22

Gly Phe Gly Phe Val Arg
1 5

<210> 23
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<400> 23

Leu Pro Asn Ser Lys Gln Ser Gln Asp Gln Pro Leu Arg
1 5 10

<210> 24
<211> 12
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<400> 24

Lys Met Asp Glu Thr Asp Ala Ser Ser Ala Val Lys
1 5 10

<210> 25
<211> 12
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<400> 25

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Thr Ser Asp Leu Ile Val Leu Gly Leu Pro Trp Lys
1               5                   10
```

<210> 26
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<213> Homo sapiens

<400> 26

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Met Ser Glu Tyr Ile Arg Val Thr Glu Asp Glu Asn Asp Glu Pro Ile
1               5                   10                  15

Glu Ile Pro Ser Glu Asp Asp Gly Thr Val Leu Leu Ser Thr Val Thr
            20                  25                  30

Ala Gln Phe Pro Gly Ala Cys Gly Leu Arg Tyr Arg Asn Pro Val Ser
        35                  40                  45

Gln Cys Met Arg Gly Val Arg Leu Val Glu Gly Ile Leu His Ala Pro
    50                  55                  60

Asp Ala Gly Trp Gly Asn Leu Val Tyr Val Val Asn Tyr Pro Lys Asp
65                  70                  75                  80

Asn Lys Arg Lys Met Asp Glu Thr Asp Ala Ser Ser Ala Val Lys Val
                85                  90                  95

Lys Arg Ala Val Gln Lys Thr Ser Asp Leu Ile Val Leu Gly Leu Pro
            100                 105                 110

Trp Lys Thr Thr Glu Gln Asp Leu Lys Glu Tyr Phe Ser Thr Phe Gly
        115                 120                 125

Glu Val Leu Met Val Gln Val Lys Lys Asp Leu Lys Thr Gly His Ser
    130                 135                 140

Lys Gly Phe Gly Phe Val Arg Phe Thr Glu Tyr Glu Thr Gln Val Lys
145                 150                 155                 160

Val Met Ser Gln Arg His Met Ile Asp Gly Arg Trp Cys Asp Cys Lys
                165                 170                 175

Leu Pro Asn Ser Lys Gln Ser Gln Asp Glu Pro Leu Arg Ser Arg Lys
            180                 185                 190

Val Phe Val Gly Arg Cys Thr Glu Asp Met Thr Glu Asp Glu Leu Arg
        195                 200                 205

Glu Phe Phe Ser Gln Tyr Gly Asp Val Met Asp Val Phe Ile Pro Lys
    210                 215                 220

Pro Phe Arg Ala Phe Ala Phe Val Thr Phe Ala Asp Asp Gln Ile Ala
225                 230                 235                 240

Gln Ser Leu Cys Gly Glu Asp Leu Ile Ile Lys Gly Ile Ser Val His
                245                 250                 255
```

```
Ile Ser Asn Ala Glu Pro Lys His Asn Ser Asn Arg Gln Leu Glu Arg
            260                 265                 270

Ser Gly Arg Phe Gly Gly Asn Pro Gly Gly Phe Gly Asn Gln Gly Gly
        275                 280                 285

Phe Gly Asn Ser Arg Gly Gly Gly Ala Gly Leu Gly Asn Asn Gln Gly
    290                 295                 300

Ser Asn Met Gly Gly Gly Met Asn Phe Gly Ala Phe Ser Ile Asn Pro
305                 310                 315                 320

Ala Met Met Ala Ala Ala Gln Ala Ala Leu Gln Ser Ser Trp Gly Met
                325                 330                 335

Met Gly Met Leu Ala Ser Gln Gln Asn Gln Ser Gly Pro Ser Gly Asn
            340                 345                 350

Asn Gln Asn Gln Gly Asn Met Gln Arg Glu Pro Asn Gln Ala Phe Gly
        355                 360                 365

Ser Gly Asn Asn Ser Tyr Ser Gly Ser Asn Ser Gly Ala Ala Ile Gly
    370                 375                 380

Trp Gly Ser Ala Ser Asn Ala Gly Ser Gly Ser Gly Phe Asn Gly Gly
385                 390                 395                 400

Phe Gly Ser Ser Met Asp Ser Lys Ser Ser Gly Trp Gly Met
                405                 410
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<210> 27
<211> 4
<212> PRT
<213> Homo sapiens

<400> 27

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Asn Tyr Tyr Arg
1
```

<210> 28
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<213> Homo sapiens

<400> 28

```
Asn Tyr Tyr Arg
1
```

<210> 29
<211> 6
<212> PRT
<213> Homo sapiens

<400> 29

Val Gln Glu Ala Gln Lys
1 5

<210> 30
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<400> 30

Glu Val Ala Asp Cys Phe Lys
1 5

<210> 31
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<212> PRT
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His Asp Gly Thr Gly Gly Gln Ser Ile Tyr Gly Asp Lys Phe Glu Asp
1 5 10 15

Glu Asn Phe Asp Val Leu
20

<210> 32
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<223> wherein Xaa is an unidentified amino acid

<400> 32

Ile Thr Met Glu Leu Phe Xaa Asn Ile Val Pro Arg
1 5 10

<210> 33
<211> 26
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<213> Homo sapiens

<220>
<221> misc_feature
<222> (19)..(24)
<223> wherein each Xaa is an unidentified amino acid

<400> 33

His Thr Gly Pro Gly Leu Leu Ser Met Ala Asn Gln Gly Gln Asn Thr

```
1               5                   10                  15

Asn Asn Xaa Xaa Phe Val Ile Xaa Leu Lys
            20                  25

<210>  34
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<212>  PRT
<213>  Homo sapiens

<400>  34

Met Arg Arg Ser Lys Ala Asp Val Glu Arg Tyr Ile Ala Ser Val Gln
1               5                   10                  15

Gly Ser Thr Pro Ser Pro Arg Gln Lys Ser Met Lys Gly Phe Tyr Phe
            20                  25                  30

Ala Lys Leu Tyr Tyr Glu Ala Lys Glu Tyr Asp Leu Ala Lys Lys Tyr
        35                  40                  45

Ile Cys Thr Tyr Ile Asn Val Gln Glu Arg Asp Pro Lys Ala His Arg
    50                  55                  60

Phe Leu Gly Leu Leu Tyr Glu Leu Glu Glu Asn Thr Asp Lys Ala Val
65                  70                  75                  80

Glu Cys Tyr Arg Arg Ser Val Glu Leu Asn Pro Thr Gln Lys Asp Leu
                85                  90                  95

Val Leu Lys Ile Ala Glu Leu Leu Cys Lys Asn Asp Val Thr Asp Gly
            100                 105                 110

Arg Ala Lys Tyr Trp Leu Glu Arg Ala Ala Lys Leu Phe Pro Gly Ser
        115                 120                 125

Pro Ala Ile Tyr Lys Leu Lys Glu Gln Leu Leu Asp Cys Glu Gly Glu
    130                 135                 140

Asp Gly Trp Asn Lys Leu Phe Asp Leu Ile Gln Ser Glu Leu Tyr Val
145                 150                 155                 160

Arg Pro Asp Asp Val His Val Asn Ile Arg Leu Val Glu Val Tyr Arg
                165                 170                 175

Ser Thr Lys Arg Leu Lys Asp Ala Val Ala His Cys His Glu Ala Glu
            180                 185                 190

Arg Asn Ile Ala Leu Arg Ser Ser Leu Glu Trp Asn Ser Cys Val Val
        195                 200                 205

Gln Thr Leu Lys Glu Tyr Leu Glu Ser Leu Gln Cys Leu Glu Ser Asp
    210                 215                 220

Lys Ser Asp Trp Arg Ala Thr Asn Thr Asp Leu Leu Leu Ala Tyr Ala
225                 230                 235                 240
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Asn Leu Met Leu Leu Thr Leu Ser Thr Arg Asp Val Gln Glu Ser Arg
                245                 250                 255

Glu Leu Leu Gln Ser Phe Asp Ser Ala Leu Gln Ser Val Lys Ser Leu
            260                 265                 270

Gly Gly Asn Asp Glu Leu Ser Ala Thr Phe Leu Glu Met Lys Gly His
        275                 280                 285

Phe Tyr Met His Ala Gly Ser Leu Leu Leu Lys Met Gly Gln His Ser
    290                 295                 300

Ser Asn Val Gln Trp Arg Ala Leu Ser Glu Leu Ala Ala Leu Cys Tyr
305                 310                 315                 320

Leu Ile Ala Phe Gln Val Pro Arg Pro Lys Ile Lys Leu Ile Lys Gly
                325                 330                 335

Glu Ala Gly Gln Asn Leu Leu Glu Met Met Ala Cys Asp Arg Leu Ser
            340                 345                 350

Gln Ser Gly His Met Leu Leu Asn Leu Ser Arg Gly Lys Gln Asp Phe
        355                 360                 365

Leu Lys Glu Ile Val Glu Thr Phe Ala Asn Lys Ser Gly Gln Ser Ala
    370                 375                 380

Leu Tyr Asp Ala Leu Phe Ser Ser Gln Ser Pro Lys Asp Thr Ser Phe
385                 390                 395                 400

Leu Gly Ser Asp Asp Ile Gly Asn Ile Asp Val Arg Glu Pro Glu Leu
                405                 410                 415

Glu Asp Leu Thr Arg Tyr Asp Val Gly Ala Ile Arg Ala His Asn Gly
            420                 425                 430

Ser Leu Gln His Leu Thr Trp Leu Gly Leu Gln Trp Asn Ser Leu Pro
        435                 440                 445

Ala Leu Pro Gly Ile Arg Lys Trp Leu Lys Gln Leu Phe His His Leu
    450                 455                 460

Pro His Glu Thr Ser Arg Leu Glu Thr Asn Ala Pro Glu Ser Ile Cys
465                 470                 475                 480

Ile Leu Asp Leu Glu Val Phe Leu Leu Gly Val Val Tyr Thr Ser His
                485                 490                 495

Leu Gln Leu Lys Glu Lys Cys Asn Ser His His Ser Ser Tyr Gln Pro
            500                 505                 510

Leu Cys Leu Pro Leu Pro Val Cys Lys Gln Leu Cys Thr Glu Arg Gln
        515                 520                 525

Lys Ser Trp Trp Asp Ala Val Cys Thr Leu Ile His Arg Lys Ala Val
    530                 535                 540
```

```
Pro Gly Asn Val Ala Lys Leu Arg Leu Leu Val Gln His Glu Ile Asn
545                 550                 555                 560

Thr Leu Arg Ala Gln Glu Lys His Gly Leu Gln Pro Ala Leu Leu Val
                565                 570                 575

His Trp Ala Glu Cys Leu Gln Lys Thr Gly Ser Gly Leu Asn Ser Phe
            580                 585                 590

Tyr Asp Gln Arg Glu Tyr Ile Gly Arg Ser Val His Tyr Trp Lys Lys
        595                 600                 605

Val Leu Pro Leu Leu Lys Ile Ile Lys Lys Lys Asn Ser Ile Pro Glu
    610                 615                 620

Pro Ile Asp Pro Leu Phe Lys His Phe His Ser Val Asp Ile Gln Ala
625                 630                 635                 640

Ser Glu Ile Val Glu Tyr Glu Glu Asp Ala His Ile Thr Phe Ala Ile
                645                 650                 655

Leu Asp Ala Val Asn Gly Asn Ile Glu Asp Ala Val Thr Ala Phe Glu
            660                 665                 670

Ser Ile Lys Ser Val Val Ser Tyr Trp Asn Leu Ala Leu Ile Phe His
        675                 680                 685

Arg Lys Ala Glu Asp Ile Glu Asn Asp Ala Leu Ser Pro Glu Glu Gln
    690                 695                 700

Glu Glu Cys Lys Asn Tyr Leu Arg Lys Thr Arg Asp Tyr Leu Ile Lys
705                 710                 715                 720

Ile Ile Asp Asp Ser Asp Ser Asn Leu Ser Val Val Lys Lys Leu Pro
                725                 730                 735

Val Pro Leu Glu Ser Val Lys Glu Met Leu Asn Ser Val Met Gln Glu
            740                 745                 750

Leu Glu Asp Tyr Ser Glu Gly Gly Pro Leu Tyr Lys Asn Gly Ser Leu
        755                 760                 765

Arg Asn Ala Asp Ser Glu Ile Lys Arg Ser Thr Pro Ser Pro Thr Arg
    770                 775                 780

Tyr Ser Leu Ser Pro Ser Lys Ser Tyr Lys Tyr Ser Pro Lys Thr Pro
785                 790                 795                 800

Pro Arg Trp Ala Glu Asp Gln Asn Ser Leu Leu Lys Met Ile Cys Gln
                805                 810                 815

Gln Val Glu Ala Ile Lys Lys Glu Met Gln Glu Leu Lys Leu Asn Ser
            820                 825                 830

Ser Asn Ser Ala Ser Pro His Arg Trp Pro Thr Glu Asn Tyr Gly Pro
        835                 840                 845
```

```
Asp Ser Val Pro Asp Gly Tyr Gln Gly Ser Gln Thr Phe His Gly Ala
    850                 855                 860

Pro Leu Thr Val Ala Thr Thr Gly Pro Ser Val Tyr Tyr Ser Gln Ser
865                 870                 875                 880

Pro Ala Tyr Asn Ser Gln Tyr Leu Leu Arg Pro Ala Ala Asn Val Thr
                885                 890                 895

Pro Thr Lys Gly Pro Val Tyr Gly Met Asn Arg Leu Pro Pro Gln Gln
            900                 905                 910

His Ile Tyr Ala Tyr Pro Gln Gln Met His Thr Pro Pro Val Gln Ser
        915                 920                 925

Ser Ser Ala Cys Met Phe Ser Gln Glu Met Tyr Gly Pro Pro Ala Leu
    930                 935                 940

Arg Phe Glu Ser Pro Ala Thr Gly Ile Leu Ser Pro Arg Gly Asp Asp
945                 950                 955                 960

Tyr Phe Asn Tyr Asn Val Gln Gln Thr Ser Thr Asn Pro Pro Leu Pro
                965                 970                 975

Glu Pro Gly Tyr Phe Thr Lys Pro Pro Ile Ala Ala His Ala Ser Arg
            980                 985                 990

Ser Ala Glu Ser Lys Thr Ile Glu  Phe Gly Lys Thr Asn  Phe Val Gln
        995                 1000                1005

Pro Met  Pro Gly Glu Gly Leu  Arg Pro Ser Leu Pro  Thr Gln Ala
    1010                1015                1020

His Thr  Thr Gln Pro Thr Pro  Phe Lys Phe Asn Ser  Asn Phe Lys
    1025                1030                1035

Ser Asn  Asp Gly Asp Phe Thr  Phe Ser Ser Pro Gln  Val Val Thr
    1040                1045                1050

Gln Pro  Pro Pro Ala Ala Tyr  Ser Asn Ser Glu Ser  Leu Leu Gly
    1055                1060                1065

Leu Leu  Thr Ser Asp Lys Pro  Leu Gln Gly Asp Gly  Tyr Ser Gly
    1070                1075                1080

Ala Lys  Pro Ile Pro Gly Gly  Gln Thr Ile Gly Pro  Arg Asn Thr
    1085                1090                1095

Phe Asn  Phe Gly Ser Lys Asn  Val Ser Gly Ile Ser  Phe Thr Glu
    1100                1105                1110

Asn Met  Gly Ser Ser Gln Gln  Lys Asn Ser Gly Phe  Arg Arg Ser
    1115                1120                1125

Asp Asp  Met Phe Thr Phe His  Gly Pro Gly Lys Ser  Val Phe Gly
    1130                1135                1140
```

```
Thr Pro  Thr Leu Glu Thr Ala  Asn Lys Asn His Glu  Thr Asp Gly
    1145                 1150                 1155

Gly Ser  Ala His Gly Asp Asp  Asp Asp Asp Gly Pro  His Phe Glu
    1160                 1165                 1170

Pro Val  Val Pro Leu Pro Asp  Lys Ile Glu Val Lys  Thr Gly Glu
    1175                 1180                 1185

Glu Asp  Glu Glu Glu Phe Phe  Cys Asn Arg Ala Lys  Leu Phe Arg
    1190                 1195                 1200

Phe Asp  Val Glu Ser Lys Glu  Trp Lys Glu Arg Gly  Ile Gly Asn
    1205                 1210                 1215

Val Lys  Ile Leu Arg His Lys  Thr Ser Gly Lys Ile  Arg Leu Leu
    1220                 1225                 1230

Met Arg  Arg Glu Gln Val Leu  Lys Ile Cys Ala Asn  His Tyr Ile
    1235                 1240                 1245

Ser Pro  Asp Met Lys Leu Thr  Pro Asn Ala Gly Ser  Asp Arg Ser
    1250                 1255                 1260

Phe Val  Trp His Ala Leu Asp  Tyr Ala Asp Glu Leu  Pro Lys Pro
    1265                 1270                 1275

Glu Gln  Leu Ala Ile Arg Phe  Lys Thr Pro Glu Glu  Ala Ala Leu
    1280                 1285                 1290

Phe Lys  Cys Lys Phe Glu Glu  Ala Gln Ser Ile Leu  Lys Ala Pro
    1295                 1300                 1305

Gly Thr  Asn Val Ala Met Ala  Ser Asn Gln Ala Val  Arg Ile Val
    1310                 1315                 1320

Lys Glu  Pro Thr Ser His Asp  Asn Lys Asp Ile Cys  Lys Ser Asp
    1325                 1330                 1335

Ala Gly  Asn Leu Asn Phe Glu  Phe Gln Val Ala Lys  Lys Glu Gly
    1340                 1345                 1350

Ser Trp  Trp His Cys Asn Ser  Cys Ser Leu Lys Asn  Ala Ser Thr
    1355                 1360                 1365

Ala Lys  Lys Cys Val Ser Cys  Gln Asn Leu Asn Pro  Ser Asn Lys
    1370                 1375                 1380

Glu Leu  Val Gly Pro Pro Leu  Ala Glu Thr Val Phe  Thr Pro Lys
    1385                 1390                 1395

Thr Ser  Pro Glu Asn Val Gln  Asp Arg Phe Ala Leu  Val Thr Pro
    1400                 1405                 1410

Lys Lys  Glu Gly His Trp Asp  Cys Ser Ile Cys Leu  Val Arg Asn
    1415                 1420                 1425
```

```
Glu Pro  Thr Val Ser Arg Cys  Ile Ala Cys Gln Asn  Thr Lys Ser
    1430                 1435                 1440

Ala Asn  Lys Ser Gly Ser Ser  Phe Val His Gln Ala  Ser Phe Lys
    1445                 1450                 1455

Phe Gly  Gln Gly Asp Leu Pro  Lys Pro Ile Asn Ser  Asp Phe Arg
    1460                 1465                 1470

Ser Val  Phe Ser Thr Lys Glu  Gly Gln Trp Asp Cys  Ser Ala Cys
    1475                 1480                 1485

Leu Val  Gln Asn Glu Gly Ser  Ser Thr Lys Cys Ala  Ala Cys Gln
    1490                 1495                 1500

Asn Pro  Arg Lys Gln Ser Leu  Pro Ala Thr Ser Ile  Pro Thr Pro
    1505                 1510                 1515

Ala Ser  Phe Lys Phe Gly Thr  Ser Glu Thr Ser Lys  Thr Leu Lys
    1520                 1525                 1530

Ser Gly  Phe Glu Asp Met Phe  Ala Lys Lys Glu Gly  Gln Trp Asp
    1535                 1540                 1545

Cys Ser  Ser Cys Leu Val Arg  Asn Glu Ala Asn Ala  Thr Arg Cys
    1550                 1555                 1560

Val Ala  Cys Gln Asn Pro Asp  Lys Pro Ser Pro Ser  Thr Ser Val
    1565                 1570                 1575

Pro Ala  Pro Ala Ser Phe Lys  Phe Gly Thr Ser Glu  Thr Ser Lys
    1580                 1585                 1590

Ala Pro  Lys Ser Gly Phe Glu  Gly Met Phe Thr Lys  Lys Glu Gly
    1595                 1600                 1605

Gln Trp  Asp Cys Ser Val Cys  Leu Val Arg Asn Glu  Ala Ser Ala
    1610                 1615                 1620

Thr Lys  Cys Ile Ala Cys Gln  Asn Pro Gly Lys Gln  Asn Gln Thr
    1625                 1630                 1635

Thr Ser  Ala Val Ser Thr Pro  Ala Ser Ser Glu Thr  Ser Lys Ala
    1640                 1645                 1650

Pro Lys  Ser Gly Phe Glu Gly  Met Phe Thr Lys Lys  Glu Gly Gln
    1655                 1660                 1665

Trp Asp  Cys Ser Val Cys Leu  Val Arg Asn Glu Ala  Ser Ala Thr
    1670                 1675                 1680

Lys Cys  Ile Ala Cys Gln Asn  Pro Gly Lys Gln Asn  Gln Thr Thr
    1685                 1690                 1695

Ser Ala  Val Ser Thr Pro Ala  Ser Ser Glu Thr Ser  Lys Ala Pro
    1700                 1705                 1710
```

```
Lys Ser  Gly Phe Glu Gly Met  Phe Thr Lys Lys Glu  Gly Gln Trp
    1715                 1720                 1725

Asp Cys  Ser Val Cys Leu Val  Arg Asn Glu Ala Ser  Ala Thr Lys
    1730                 1735                 1740

Cys Ile  Ala Cys Gln Cys Pro  Ser Lys Gln Asn Gln  Thr Thr Ala
    1745                 1750                 1755

Ile Ser  Thr Pro Ala Ser Ser  Glu Ile Ser Lys Ala  Pro Lys Ser
    1760                 1765                 1770

Gly Phe  Glu Gly Met Phe Ile  Arg Lys Gly Gln Trp  Asp Cys Ser
    1775                 1780                 1785

Val Cys  Cys Val Gln Asn Glu  Ser Ser Ser Leu Lys  Cys Val Ala
    1790                 1795                 1800

Cys Asp  Ala Ser Lys Pro Thr  His Lys Pro Ile Ala  Glu Ala Pro
    1805                 1810                 1815

Ser Ala  Phe Thr Leu Gly Ser  Glu Met Lys Leu His  Asp Ser Ser
    1820                 1825                 1830

Gly Ser  Gln Val Gly Thr Gly  Phe Lys Ser Asn Phe  Ser Glu Lys
    1835                 1840                 1845

Ala Ser  Lys Phe Gly Asn Thr  Glu Gln Gly Phe Lys  Phe Gly His
    1850                 1855                 1860

Val Asp  Gln Glu Asn Ser Pro  Ser Phe Met Phe Gln  Gly Ser Ser
    1865                 1870                 1875

Asn Thr  Glu Phe Lys Ser Thr  Lys Glu Gly Phe Ser  Ile Pro Val
    1880                 1885                 1890

Ser Ala  Asp Gly Phe Lys Phe  Gly Ile Ser Glu Pro  Gly Asn Gln
    1895                 1900                 1905

Glu Lys  Lys Ser Glu Lys Pro  Leu Glu Asn Gly Thr  Gly Phe Gln
    1910                 1915                 1920

Ala Gln  Asp Ile Ser Gly Gln  Lys Asn Gly Arg Gly  Val Ile Phe
    1925                 1930                 1935

Gly Gln  Thr Ser Ser Thr Phe  Thr Phe Ala Asp Leu  Ala Lys Ser
    1940                 1945                 1950

Thr Ser  Gly Glu Gly Phe Gln  Phe Gly Lys Lys Asp  Pro Asn Phe
    1955                 1960                 1965

Lys Gly  Phe Ser Gly Ala Gly  Glu Lys Leu Phe Ser  Ser Gln Tyr
    1970                 1975                 1980

Gly Lys  Met Ala Asn Lys Ala  Asn Thr Ser Gly Asp  Phe Glu Lys
    1985                 1990                 1995
```

```
Asp Asp  Asp Ala Tyr Lys Thr  Glu Asp Ser Asp Asp  Ile His Phe
    2000                 2005                 2010

Glu Pro  Val Val Gln Met Pro  Glu Lys Val Glu Leu  Val Thr Gly
    2015                 2020                 2025

Glu Glu  Asp Glu Lys Val Leu  Tyr Ser Gln Arg Val  Lys Leu Phe
    2030                 2035                 2040

Arg Phe  Asp Ala Glu Val Ser  Gln Trp Lys Glu Arg  Gly Leu Gly
    2045                 2050                 2055

Asn Leu  Lys Ile Leu Lys Asn  Glu Val Asn Gly Lys  Leu Arg Met
    2060                 2065                 2070

Leu Met  Arg Arg Glu Gln Val  Leu Lys Val Cys Ala  Asn His Trp
    2075                 2080                 2085

Ile Thr  Thr Thr Met Asn Leu  Lys Pro Leu Ser Gly  Ser Asp Arg
    2090                 2095                 2100

Ala Trp  Met Trp Leu Ala Ser  Asp Phe Ser Asp Gly  Asp Ala Lys
    2105                 2110                 2115

Leu Glu  Gln Leu Ala Ala Lys  Phe Lys Thr Pro Glu  Leu Ala Glu
    2120                 2125                 2130

Glu Phe  Lys Gln Lys Phe Glu  Glu Cys Gln Arg Leu  Leu Leu Asp
    2135                 2140                 2145

Ile Pro  Leu Gln Thr Pro His  Lys Leu Val Asp Thr  Gly Arg Ala
    2150                 2155                 2160

Ala Lys  Leu Ile Gln Arg Ala  Glu Glu Met Lys Ser  Gly Leu Lys
    2165                 2170                 2175

Asp Phe  Lys Thr Phe Leu Thr  Asn Asp Gln Thr Lys  Val Thr Glu
    2180                 2185                 2190

Glu Glu  Asn Lys Gly Ser Gly  Thr Gly Ala Ala Gly  Ala Ser Asp
    2195                 2200                 2205

Thr Thr  Ile Lys Pro Asn Pro  Glu Asn Thr Gly Pro  Thr Leu Glu
    2210                 2215                 2220

Trp Asp  Asn Tyr Asp Leu Arg  Glu Asp Ala Leu Asp  Asp Ser Val
    2225                 2230                 2235

Ser Ser  Ser Ser Val His Ala  Ser Pro Leu Ala Ser  Ser Pro Val
    2240                 2245                 2250

Arg Lys  Asn Leu Phe Arg Phe  Gly Glu Ser Thr Thr  Gly Phe Asn
    2255                 2260                 2265

Phe Ser  Phe Lys Ser Ala Leu  Ser Pro Ser Lys Ser  Pro Ala Lys
    2270                 2275                 2280
```

```
Leu Asn  Gln Ser Gly Thr Ser  Val Gly Thr Asp Glu  Glu Ser Asp
    2285                 2290                 2295

Val Thr  Gln Glu Glu Glu Arg  Asp Gly Gln Tyr Phe  Glu Pro Val
    2300                 2305                 2310

Val Pro  Leu Pro Asp Leu Val  Glu Val Ser Ser Gly  Glu Glu Asn
    2315                 2320                 2325

Glu Gln  Val Val Phe Ser His  Arg Ala Lys Leu Tyr  Arg Tyr Asp
    2330                 2335                 2340

Lys Asp  Val Gly Gln Trp Lys  Glu Arg Gly Ile Gly  Asp Ile Lys
    2345                 2350                 2355

Ile Leu  Gln Asn Tyr Asp Asn  Lys Gln Val Arg Ile  Val Met Arg
    2360                 2365                 2370

Arg Asp  Gln Val Leu Lys Leu  Cys Ala Asn His Arg  Ile Thr Pro
    2375                 2380                 2385

Asp Met  Thr Leu Gln Asn Met  Lys Gly Thr Glu Arg  Val Trp Leu
    2390                 2395                 2400

Trp Thr  Ala Cys Asp Phe Ala  Asp Gly Glu Arg Lys  Val Glu His
    2405                 2410                 2415

Leu Ala  Val Arg Phe Lys Leu  Gln Asp Val Ala Asp  Ser Phe Lys
    2420                 2425                 2430

Lys Ile  Phe Asp Glu Ala Lys  Thr Ala Gln Glu Lys  Asp Ser Leu
    2435                 2440                 2445

Ile Thr  Pro His Val Ser Arg  Ser Ser Thr Pro Arg  Glu Ser Pro
    2450                 2455                 2460

Cys Gly  Lys Ile Ala Val Ala  Val Leu Glu Glu Thr  Thr Arg Glu
    2465                 2470                 2475

Arg Thr  Asp Val Ile Gln Gly  Asp Asp Val Ala Asp  Ala Thr Ser
    2480                 2485                 2490

Glu Val  Glu Val Ser Ser Thr  Ser Glu Thr Thr Pro  Lys Ala Val
    2495                 2500                 2505

Val Ser  Pro Pro Lys Phe Val  Phe Gly Ser Glu Ser  Val Lys Ser
    2510                 2515                 2520

Ile Phe  Ser Ser Glu Lys Ser  Lys Pro Phe Ala Phe  Gly Asn Ser
    2525                 2530                 2535

Ser Ala  Thr Gly Ser Leu Phe  Gly Phe Ser Phe Asn  Ala Pro Leu
    2540                 2545                 2550

Lys Ser  Asn Asn Ser Glu Thr  Ser Ser Val Ala Gln  Ser Gly Ser
    2555                 2560                 2565
```

```
Glu Ser  Lys Val Glu Pro Lys  Lys Cys Glu Leu Ser  Lys Asn Ser
    2570                 2575                 2580

Asp Ile  Glu Gln Ser Ser Asp  Ser Lys Val Lys Asn  Leu Phe Ala
    2585                 2590                 2595

Ser Phe  Pro Thr Glu Glu Ser  Ser Ile Asn Tyr Thr  Phe Lys Thr
    2600                 2605                 2610

Pro Glu  Lys Ala Lys Glu Lys  Lys Lys Pro Glu Asp  Ser Pro Ser
    2615                 2620                 2625

Asp Asp  Asp Val Leu Ile Val  Tyr Glu Leu Thr Pro  Thr Ala Glu
    2630                 2635                 2640

Gln Lys  Ala Leu Ala Thr Lys  Leu Lys Leu Pro Pro  Thr Phe Phe
    2645                 2650                 2655

Cys Tyr  Lys Asn Arg Pro Asp  Tyr Val Ser Glu Glu  Glu Glu Asp
    2660                 2665                 2670

Asp Glu  Asp Phe Glu Thr Ala  Val Lys Lys Leu Asn  Gly Lys Leu
    2675                 2680                 2685

Tyr Leu  Asp Gly Ser Glu Lys  Cys Arg Pro Leu Glu  Glu Asn Thr
    2690                 2695                 2700

Ala Asp  Asn Glu Lys Glu Cys  Ile Ile Val Trp Glu  Lys Lys Pro
    2705                 2710                 2715

Thr Val  Glu Glu Lys Ala Lys  Ala Asp Thr Leu Lys  Leu Pro Pro
    2720                 2725                 2730

Thr Phe  Phe Cys Gly Val Cys  Ser Asp Thr Asp Glu  Asp Asn Gly
    2735                 2740                 2745

Asn Gly  Glu Asp Phe Gln Ser  Glu Leu Gln Lys Val  Gln Glu Ala
    2750                 2755                 2760

Gln Lys  Ser Gln Thr Glu Glu  Ile Thr Ser Thr Thr  Asp Ser Val
    2765                 2770                 2775

Tyr Thr  Gly Gly Thr Glu Val  Met Val Pro Ser Phe  Cys Lys Ser
    2780                 2785                 2790

Glu Glu  Pro Asp Ser Ile Thr  Lys Ser Ile Ser Ser  Pro Ser Val
    2795                 2800                 2805

Ser Ser  Glu Thr Met Asp Lys  Pro Val Asp Leu Ser  Thr Arg Lys
    2810                 2815                 2820

Glu Ile  Asp Thr Asp Ser Thr  Ser Gln Gly Glu Ser  Lys Ile Val
    2825                 2830                 2835

Ser Phe  Gly Phe Gly Ser Ser  Thr Gly Leu Ser Phe  Ala Asp Leu
    2840                 2845                 2850
```

```
Ala Ser  Ser Asn Ser Gly Asp  Phe Ala Phe Gly Ser  Lys Asp Lys
    2855                 2860                 2865

Asn Phe  Gln Trp Ala Asn Thr  Gly Ala Ala Val Phe  Gly Thr Gln
    2870                 2875                 2880

Ser Val  Gly Thr Gln Ser Ala  Gly Lys Val Gly Glu  Asp Glu Asp
    2885                 2890                 2895

Gly Ser  Asp Glu Glu Val Val  His Asn Glu Asp Ile  His Phe Glu
    2900                 2905                 2910

Pro Ile  Val Ser Leu Pro Glu  Val Glu Val Lys Ser  Gly Glu Glu
    2915                 2920                 2925

Asp Glu  Glu Ile Leu Phe Lys  Glu Arg Ala Lys Leu  Tyr Arg Trp
    2930                 2935                 2940

Asp Arg  Asp Val Ser Gln Trp  Lys Glu Arg Gly Val  Gly Asp Ile
    2945                 2950                 2955

Lys Ile  Leu Trp His Thr Met  Lys Asn Tyr Tyr Arg  Ile Leu Met
    2960                 2965                 2970

Arg Arg  Asp Gln Val Phe Lys  Val Cys Ala Asn His  Val Ile Thr
    2975                 2980                 2985

Lys Thr  Met Glu Leu Lys Pro  Leu Asn Val Ser Asn  Asn Ala Leu
    2990                 2995                 3000

Val Trp  Thr Ala Ser Asp Tyr  Ala Asp Gly Glu Ala  Lys Val Glu
    3005                 3010                 3015

Gln Leu  Ala Val Arg Phe Lys  Thr Lys Glu Val Ala  Asp Cys Phe
    3020                 3025                 3030

Lys Lys  Thr Phe Glu Glu Cys  Gln Gln Asn Leu Met  Lys Leu Gln
    3035                 3040                 3045

Lys Gly  His Val Ser Leu Ala  Ala Glu Leu Ser Lys  Glu Thr Asn
    3050                 3055                 3060

Pro Val  Val Phe Phe Asp Val  Cys Ala Asp Gly Glu  Pro Leu Gly
    3065                 3070                 3075

Arg Ile  Thr Met Glu Leu Phe  Ser Asn Ile Val Pro  Arg Thr Ala
    3080                 3085                 3090

Glu Asn  Phe Arg Ala Leu Cys  Thr Gly Glu Lys Gly  Phe Gly Phe
    3095                 3100                 3105

Lys Asn  Ser Ile Phe His Arg  Val Ile Pro Asp Phe  Val Cys Gln
    3110                 3115                 3120

Gly Gly  Asp Ile Thr Lys His  Asp Gly Thr Gly Gly  Gln Ser Ile
    3125                 3130                 3135
```

```
Tyr Gly  Asp Lys Phe Glu Asp  Glu Asn Phe Asp Val  Lys His Thr
    3140                 3145                 3150

Gly Pro  Gly Leu Leu Ser Met  Ala Asn Gln Gly Gln  Asn Thr Asn
    3155                 3160                 3165

Asn Ser  Gln Phe Val Ile Thr  Leu Lys Lys Ala Glu  His Leu Asp
    3170                 3175                 3180

Phe Lys  His Val Val Phe Gly  Phe Val Lys Asp Gly  Met Asp Thr
    3185                 3190                 3195

Val Lys  Lys Ile Glu Ser Phe  Gly Ser Pro Lys Gly  Ser Val Cys
    3200                 3205                 3210

Arg Arg  Ile Thr Ile Thr Glu  Cys Gly Gln Ile
    3215                 3220
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Glu Phe Glu Ser Arg
1               5
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Thr Tyr Ser Ala Lys
1               5
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Leu Asp Asn Ala Arg
1               5
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Thr Tyr Ser Ala Lys
1               5
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Asn Ile Tyr Ser Glu Glu Leu Arg
1 5

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Thr Ala Leu Ser Glu Lys Arg
1 5

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Leu Ala Leu Asp Met Glu Ile His Ala Tyr Arg
1 5 10

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Glu Met Ala Glu Met Arg Ala Arg
1 5

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<400> 43

Glu Glu Leu Asp Phe Gln Lys Asn Ile Tyr Ser Glu Glu Leu Arg
1 5 10 15

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Met Gln Gln Gln Leu Asp Glu Tyr Gln Glu Leu Leu Asp Ile Lys
1 5 10 15

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<211> 15
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<213> Homo sapiens

<400> 45

Glu Glu Leu Asp Phe Gln Lys Asn Ile Tyr Ser Glu Glu Leu Arg
1 5 10 15

<210> 46
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Thr Ala Leu Ser Glu Lys Arg Thr Leu Glu Gly Glu Leu His Asp Leu
1 5 10 15

Arg Gly Gln Val Ala Lys Leu Glu Ala Ala Leu Gly Glu Ala Lys Lys
20 25 30

Gln Leu Gln Asp Glu Met Leu Arg Arg Val Asp Ala Glu Asn Arg Leu
35 40 45

Gln Thr Met Lys Glu Glu Leu Asp Phe Gln Lys Asn Ile Tyr Ser Glu
50 55 60

Glu Leu Arg Glu Thr Lys Arg Arg His Glu Thr Arg Leu Val Glu Ile
65 70 75 80

Asp Asn Gly Lys Gln Arg Glu Phe Glu Ser Arg Leu Ala Asp Ala Leu
85 90 95

Gln Glu Leu Arg Ala Gln His Glu Asp Gln Val Glu Gln Tyr Lys Lys
100 105 110

Glu Leu Glu Lys Thr Tyr Ser Ala Lys Leu Asp Asn Ala Arg Gln Ser
115 120 125

Ala Glu Arg Asn Ser Asn Leu Val Gly Ala Ala His Glu Glu Leu Gln
130 135 140

Gln Ser Arg Ile Arg Ile Asp Ser Leu Ser Ala Gln Leu Ser Gln Leu
145 150 155 160

Gln Lys Gln Leu Ala Ala Lys Glu Ala Lys Leu Arg Asp Leu Glu Asp
165 170 175

Ser Leu Ala Arg Glu Arg Asp Thr Ser Arg Arg Leu Leu Ala Glu Lys
180 185 190

```
Glu Arg Glu Met Ala Glu Met Arg Ala Arg Met Gln Gln Gln Leu Asp
        195                 200                 205

Glu Tyr Gln Glu Leu Leu Asp Ile Lys Leu Ala Leu Asp Met Glu Ile
    210                 215                 220

His Ala Tyr Arg Lys Leu Leu Glu Gly Glu Glu Glu Arg Leu Arg Leu
225                 230                 235                 240

Ser Pro Ser Pro Thr Ser Gln Arg Ser Arg Gly Arg Ala Ser Ser His
                245                 250                 255

Ser Ser Gln Thr Gln Gly Gly Gly Ser Val Thr Lys Lys Arg Lys Leu
            260                 265                 270

Glu Ser Thr Glu Ser Arg Ser Ser Phe Ser Gln His Ala Arg Thr Ser
        275                 280                 285

Gly Arg Val Ala Val Glu Glu Val Asp Glu Glu Gly Lys Phe Val Arg
    290                 295                 300

Leu Arg Asn Lys Ser Asn Glu Asp Gln Ser Met Gly Asn Trp Gln Ile
305                 310                 315                 320

Lys Arg Gln Asn Gly Asp Asp Pro Leu Leu Thr Tyr Arg Phe Pro Pro
                325                 330                 335

Lys Phe Thr Leu Lys Ala Gly Gln Val Val Thr Ile Trp Ala Ala Gly
            340                 345                 350

Ala Gly Ala Thr His Ser Pro Pro Thr Asp Leu Val Trp Lys Ala Gln
        355                 360                 365

Asn Thr Trp Gly Cys Gly Asn Ser Leu Arg Thr Ala Leu Ile Asn Ser
    370                 375                 380

Thr Gly Glu Glu Val Ala Met Arg Lys Leu Val Arg Ser Val Thr Val
385                 390                 395                 400

Val Glu Asp Asp Glu Asp Glu Asp Gly Asp Asp Leu Leu His His His
                405                 410                 415

His Gly Ser His Cys Ser Ser Ser Gly Asp Pro Ala Glu Tyr Asn Leu
            420                 425                 430

Arg Ser Arg Thr Val Leu Cys Gly Thr Cys Gly Gln Pro Ala Asp Lys
        435                 440                 445

Ala Ser Ala Ser Gly Ser Gly Ala Gln Val Gly Gly Pro Ile Ser Ser
    450                 455                 460

Gly Ser Ser Ala Ser Ser Val Thr Val Thr Arg Ser Tyr Arg Ser Val
465                 470                 475                 480

Gly Gly Ser Gly Gly Gly Ser Phe Gly Asp Asn Leu Val Thr Arg Ser
                485                 490                 495
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Tyr Leu Leu Gly Asn Ser Ser Pro Arg Thr Gln Ser Pro Gln Asn Cys
            500                 505                 510

Ser Ile Met
        515

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<212>  DNA
<213>  Homo sapiens

<220>
<221>  CDS
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gcgtgacacg cccttgactt gaggacc atg aac cgc agc cgc cag gtg acg tgc    114
                               Met Asn Arg Ser Arg Gln Val Thr Cys
                               1               5

gtg gcc tgg gtc cgc tgc ggc gtg gcc aaa gag aca cca gac aag gta      162
Val Ala Trp Val Arg Cys Gly Val Ala Lys Glu Thr Pro Asp Lys Val
10                  15                  20                  25

gag ctg agt aaa gaa gaa gta aaa cgc ctc att gct gag gca aag gag      210
Glu Leu Ser Lys Glu Glu Val Lys Arg Leu Ile Ala Glu Ala Lys Glu
                30                  35                  40

aaa ttg caa gaa gaa ggt ggt ggc agt gat gaa gag gag aca ggc agt      258
Lys Leu Gln Glu Glu Gly Gly Gly Ser Asp Glu Glu Glu Thr Gly Ser
            45                  50                  55

cct tca gaa gat ggc atg cag agt gca cgc acc cag gca cgc cca aga      306
Pro Ser Glu Asp Gly Met Gln Ser Ala Arg Thr Gln Ala Arg Pro Arg
        60                  65                  70

gag ccc ctg gag gat ggt gac cca gag gat gac agg acg ctt gat gat      354
Glu Pro Leu Glu Asp Gly Asp Pro Glu Asp Asp Arg Thr Leu Asp Asp
    75                  80                  85

gat gag ctg gct gag tac gac tta gat aaa tat gat gag gaa ggt gac      402
Asp Glu Leu Ala Glu Tyr Asp Leu Asp Lys Tyr Asp Glu Glu Gly Asp
90                  95                  100                 105

cca gat gct gag act ctt ggt gaa tct ctc ttg ggt ctt acg gtc tac      450
Pro Asp Ala Glu Thr Leu Gly Glu Ser Leu Leu Gly Leu Thr Val Tyr
                110                 115                 120

ggg agt aat gat caa gat cct tac gtt act ctg aaa gat aca gaa caa      498
Gly Ser Asn Asp Gln Asp Pro Tyr Val Thr Leu Lys Asp Thr Glu Gln
            125                 130                 135

tat gaa cgt gaa gat ttc ttg att aag ccc agt gat aat ctt ata gtt      546
Tyr Glu Arg Glu Asp Phe Leu Ile Lys Pro Ser Asp Asn Leu Ile Val
        140                 145                 150
```

```
tgt ggc cga gct gaa cag gac cag tgc aat tta gag gtg cat gtt tat      594
Cys Gly Arg Ala Glu Gln Asp Gln Cys Asn Leu Glu Val His Val Tyr
    155                 160                 165

aat caa gaa gaa gac tct ttt tat gta cac cat gat ata ctc ttg tct      642
Asn Gln Glu Glu Asp Ser Phe Tyr Val His His Asp Ile Leu Leu Ser
170                 175                 180                 185

gca tat cct ctg agt gtg gaa tgg ctg aat ttt gat cct agc cca gat      690
Ala Tyr Pro Leu Ser Val Glu Trp Leu Asn Phe Asp Pro Ser Pro Asp
                190                 195                 200

gat tct act gga aat tac att gct gta gga aac atg acc cct gtt att      738
Asp Ser Thr Gly Asn Tyr Ile Ala Val Gly Asn Met Thr Pro Val Ile
            205                 210                 215

gaa gtg tgg gac ctt gat ata gtg gac tct tta gag cca gtc ttc aca      786
Glu Val Trp Asp Leu Asp Ile Val Asp Ser Leu Glu Pro Val Phe Thr
        220                 225                 230

ctc gga agt aaa ctt tca aaa aag aag aaa aag aaa gga aag aag agt      834
Leu Gly Ser Lys Leu Ser Lys Lys Lys Lys Lys Lys Gly Lys Lys Ser
    235                 240                 245

tcc tca gca gaa ggg cat acc gat gct gtc ctt gac ctt tca tgg aat      882
Ser Ser Ala Glu Gly His Thr Asp Ala Val Leu Asp Leu Ser Trp Asn
250                 255                 260                 265

aag cta atc aga aat gtt tta gca agt gca tca gct gac aac act gta      930
Lys Leu Ile Arg Asn Val Leu Ala Ser Ala Ser Ala Asp Asn Thr Val
                270                 275                 280

att ctg tgg gat atg tcc ttg ggg aaa cca gca gct agc ctc gct gta      978
Ile Leu Trp Asp Met Ser Leu Gly Lys Pro Ala Ala Ser Leu Ala Val
            285                 290                 295

cac aca gac aag gtc caa aca ctg cag ttt cat cca ttt gaa gca cag     1026
His Thr Asp Lys Val Gln Thr Leu Gln Phe His Pro Phe Glu Ala Gln
        300                 305                 310

act ctg att tct ggc tca tat gat aag tca gtg gct ttg tat gac tgc     1074
Thr Leu Ile Ser Gly Ser Tyr Asp Lys Ser Val Ala Leu Tyr Asp Cys
    315                 320                 325

cga agt cca gat gaa agc cat cga atg tgg cga ttc agt ggg cag ata     1122
Arg Ser Pro Asp Glu Ser His Arg Met Trp Arg Phe Ser Gly Gln Ile
330                 335                 340                 345

gag aga gtg act tgg aat cac ttt tca cct tgt cat ttc ttg gcc agt     1170
Glu Arg Val Thr Trp Asn His Phe Ser Pro Cys His Phe Leu Ala Ser
                350                 355                 360

aca gat gac ggc ttt gta tat aat ttg gat gca cgt tca gat aag cca     1218
Thr Asp Asp Gly Phe Val Tyr Asn Leu Asp Ala Arg Ser Asp Lys Pro
            365                 370                 375
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att ttt aca ctt aat gca cac aat gat gaa atc tct ggt ctt gat ctt     1266
Ile Phe Thr Leu Asn Ala His Asn Asp Glu Ile Ser Gly Leu Asp Leu
        380                 385                 390

agc agt caa atc aag ggc tgt ctc gtg act gct tca gct gac aaa tac     1314
Ser Ser Gln Ile Lys Gly Cys Leu Val Thr Ala Ser Ala Asp Lys Tyr
    395                 400                 405

gtg aag atc tgg gac atc tta gga gat agg cca agt cta gtt cat tct     1362
Val Lys Ile Trp Asp Ile Leu Gly Asp Arg Pro Ser Leu Val His Ser
410                 415                 420                 425

agg gac atg aaa atg gga gtt ctc ttc tgt tct tca tgt tgc cct gat     1410
Arg Asp Met Lys Met Gly Val Leu Phe Cys Ser Ser Cys Cys Pro Asp
                430                 435                 440

ttg cca ttt att tat gcc ttt gga ggt caa aaa gaa ggg ctt cgg gtc     1458
Leu Pro Phe Ile Tyr Ala Phe Gly Gly Gln Lys Glu Gly Leu Arg Val
            445                 450                 455

tgg gat ata agc aca gtc tct tca gta aat gaa gca ttt gga aga cga     1506
Trp Asp Ile Ser Thr Val Ser Ser Val Asn Glu Ala Phe Gly Arg Arg
        460                 465                 470

gag agg ctt gtt ctt ggg agt gca aga aat tca tct att agt ggc cct     1554
Glu Arg Leu Val Leu Gly Ser Ala Arg Asn Ser Ser Ile Ser Gly Pro
    475                 480                 485

ttt ggc agc agg agc tca gat aca ccc atg gag tct taa tgaagatcat      1603
Phe Gly Ser Arg Ser Ser Asp Thr Pro Met Glu Ser
490                 495                 500

ctaatttcct gcttacctta actgggaatt ttaaaaagtt ggcctaaaaa tgttccatgc   1663

gtggcagcaa ccatgcagag tgactgaaac acaattcatt tctgactgac attcctttct   1723

gcaactgcgg tggcaccaca aatatccggt ctttgtgctt gctcttcaga tggatggttt   1783

gtaaggctct tgttgcattt cttaaaaaag agtaataaaa aggattttta aaaagtaatt   1843

ccttaaacat                                                          1853
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<400> 48

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Met Asn Arg Ser Arg Gln Val Thr Cys Val Ala Trp Val Arg Cys Gly
1               5                   10                  15

Val Ala Lys Glu Thr Pro Asp Lys Val Glu Leu Ser Lys Glu Glu Val
            20                  25                  30
```

```
Lys Arg Leu Ile Ala Glu Ala Lys Glu Lys Leu Gln Glu Glu Gly Gly
        35                  40                  45

Gly Ser Asp Glu Glu Glu Thr Gly Ser Pro Ser Glu Asp Gly Met Gln
    50                  55                  60

Ser Ala Arg Thr Gln Ala Arg Pro Arg Glu Pro Leu Glu Asp Gly Asp
65                  70                  75                  80

Pro Glu Asp Asp Arg Thr Leu Asp Asp Asp Glu Leu Ala Glu Tyr Asp
                85                  90                  95

Leu Asp Lys Tyr Asp Glu Glu Gly Asp Pro Asp Ala Glu Thr Leu Gly
            100                 105                 110

Glu Ser Leu Leu Gly Leu Thr Val Tyr Gly Ser Asn Asp Gln Asp Pro
        115                 120                 125

Tyr Val Thr Leu Lys Asp Thr Glu Gln Tyr Glu Arg Glu Asp Phe Leu
    130                 135                 140

Ile Lys Pro Ser Asp Asn Leu Ile Val Cys Gly Arg Ala Glu Gln Asp
145                 150                 155                 160

Gln Cys Asn Leu Glu Val His Val Tyr Asn Gln Glu Glu Asp Ser Phe
                165                 170                 175

Tyr Val His His Asp Ile Leu Leu Ser Ala Tyr Pro Leu Ser Val Glu
            180                 185                 190

Trp Leu Asn Phe Asp Pro Ser Pro Asp Asp Ser Thr Gly Asn Tyr Ile
        195                 200                 205

Ala Val Gly Asn Met Thr Pro Val Ile Glu Val Trp Asp Leu Asp Ile
    210                 215                 220

Val Asp Ser Leu Glu Pro Val Phe Thr Leu Gly Ser Lys Leu Ser Lys
225                 230                 235                 240

Lys Lys Lys Lys Lys Gly Lys Lys Ser Ser Ser Ala Glu Gly His Thr
                245                 250                 255
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Asp Ala Val Leu Asp Leu Ser Trp Asn Lys Leu Ile Arg Asn Val Leu
            260                 265                 270

Ala Ser Ala Ser Ala Asp Asn Thr Val Ile Leu Trp Asp Met Ser Leu
        275                 280                 285

Gly Lys Pro Ala Ala Ser Leu Ala Val His Thr Asp Lys Val Gln Thr
    290                 295                 300

Leu Gln Phe His Pro Phe Glu Ala Gln Thr Leu Ile Ser Gly Ser Tyr
305                 310                 315                 320

Asp Lys Ser Val Ala Leu Tyr Asp Cys Arg Ser Pro Asp Glu Ser His
                325                 330                 335

Arg Met Trp Arg Phe Ser Gly Gln Ile Glu Arg Val Thr Trp Asn His
            340                 345                 350

Phe Ser Pro Cys His Phe Leu Ala Ser Thr Asp Asp Gly Phe Val Tyr
        355                 360                 365

Asn Leu Asp Ala Arg Ser Asp Lys Pro Ile Phe Thr Leu Asn Ala His
    370                 375                 380

Asn Asp Glu Ile Ser Gly Leu Asp Leu Ser Ser Gln Ile Lys Gly Cys
385                 390                 395                 400

Leu Val Thr Ala Ser Ala Asp Lys Tyr Val Lys Ile Trp Asp Ile Leu
                405                 410                 415

Gly Asp Arg Pro Ser Leu Val His Ser Arg Asp Met Lys Met Gly Val
            420                 425                 430

Leu Phe Cys Ser Ser Cys Cys Pro Asp Leu Pro Phe Ile Tyr Ala Phe
        435                 440                 445

Gly Gly Gln Lys Glu Gly Leu Arg Val Trp Asp Ile Ser Thr Val Ser
    450                 455                 460

Ser Val Asn Glu Ala Phe Gly Arg Arg Glu Arg Leu Val Leu Gly Ser
465                 470                 475                 480

Ala Arg Asn Ser Ser Ile Ser Gly Pro Phe Gly Ser Arg Ser Ser Asp
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485 490 495

Thr Pro Met Glu Ser
500